

REMARKS

Claims 1, 3, 5-7, 9, 11-13, 15, and 17-18 are pending in this application. Claims 1, 3, 5-7, 9, 11-13, 15, and 17-18 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,651,106 to Ashburn (hereinafter "Ashburn") in view of U.S. Patent Application Publication No. 2001/0020945 to Hsieh et al. (hereinafter "Hsieh").

Applicants thank Examiners Amini and Brier for the telephonic interviews conducted with the undersigned on September 21, 2004 and November 4, 2004. During the interviews, the present invention was discussed in connection with Figures 6. Proposed amendments to claim 1 were discussed and agreed upon, providing clarification that the performing step was executed after all of the sorting had occurred. Agreement was also reached regarding adding the limitations of claims 2 (about the image data types) to claim 1. It was agreed that both of these amendments to claim 1 would distinguish the present invention over the cited references. Similar amendments have also been made to independent claims 7 and 13.

By the foregoing amendments, Applicants have amended the claims to further define and clarify the operation of the present invention. The independent claims (i.e., claims 1, 7, and 13) have been amended to clarify that the basic state operations are performed after all of the sorting has occurred. Independent claims 1

and 7 have also been amended to change the phrasing regarding the number of basic state operations from “one or more” to “at least one.” Independent claims 1, 7, and 13 have been further amended to include the limitations of claims 2, 8, and 14, respectively, regarding the image data types. Accordingly, dependent claims 2, 8, and 14 have been canceled.

Ashburn discloses a method and apparatus for generating triangles that can be easily filled by a triangle fill scan converter. The apparatus includes a front end board 10 for receiving graphics primitives to be rendered, with each primitive being specified by coordinate data, color data, and texture data. A frame buffer board 14 interpolates the primitive data to generate the image to be displayed on a screen. Both the front end board 10 and the frame buffer board 14 are pipelined to be able to operate on multiple primitives simultaneously (see column 4, lines 36-66). In one embodiment of Ashburn, certain hardware components may be duplicated to increase the bandwidth of the system (see column 7, lines 56-60).

The present invention relates to a method and apparatus for processing video image data, including position data, color data, and texture data. Different tasks (e.g., moving or scaling) can be performed on each image data type. Each task consists of a series of basic state operations. Each basic state operation is a single arithmetic operation, such as addition or multiplication. To quickly process image data, the present invention provides a common arithmetic unit for each basic state

operation type. The basic state operations are sorted based upon the arithmetic operation type, regardless of what task the operation originated from. The sorted basic state operations are then assigned to an appropriate common arithmetic unit, and are then performed. Unless a task requires that the basic state operations be performed in a particular order, basic state operations relating to different tasks can be concurrently performed by different arithmetic units. (See page 6, lines 1-12.)

The present invention differs from Ashburn in that Ashburn does not sort the image data by the basic state operation to be performed on the data. In regard to the rejection of claim 1, the portions of Ashburn cited by the Examiner do not disclose the present invention. Ashburn sorts the vertices of a triangle such that the longest edge of the triangle extends in the Y direction (see column 12, lines 32-38). This sorting is performed to simplify the operation of the fill scan converter (see column 11, lines 52-57). Sorting based on the vertices of a triangle is not the same as sorting the basic state operations based on the arithmetic operation type to be performed, as is done in the present invention.

Furthermore, in Ashburn, mathematical operations are performed during the sorting process ("the first portion of the plane equation being generated concurrently with sorting of the vertex data"; column 2, lines 33-35). Contrast this with the present invention as recited in independent claim 1, in which the basic state operations are performed after all of the sorting has been completed.

Hsieh relates to a method and apparatus for parallel processing multiple vertices in each iteration (paragraph 0021). Hsieh discloses working on operands that are packed data items, which comprise multiple data elements (paragraph 0029). An operation is performed on all of the data elements in a packed data item in parallel (paragraph 0030). Operations are carried out on multiple vertices at a time (paragraph 0059) and some of the operations can be complex equations (paragraphs 0071-0072).

Contrast the operation of Hsieh with the present invention, in which complex tasks are broken into basic state operations, with each of the basic state operations being separately performed. While Hsieh achieves a processing speed-up by performing multiple complex operations in parallel, the present invention achieves its speed-up by simplifying the operations to be performed.

The same remarks as applied to claim 1 are equally applicable to the Examiner's rejections of independent claims 7 and 13. Because the independent claims (i.e., claims 1, 7, and 13) of the present invention are distinguishable over Ashburn and Hsieh, the dependent claims (i.e., claims 3, 5, 6, 9, 11, 12, 15, 17, and 18) are also distinguishable over Ashburn and Hsieh, and no further discussion of the dependent claims or of the Hsieh reference are needed.

It is respectfully submitted that the amendments and remarks made herein place pending claims 1, 3, 5-7, 9, 11-13, 15, and 17-18 in condition for allowance.


Applicant: Selvaggi et al.
Application No.: 09/632,759

Accordingly, entry of this amendment as well as reconsideration and allowance of pending claims 1, 3, 5-7, 9, 11-13, 15, and 17-18 are respectfully requested.

If the Examiner does not believe that the claims are in condition for allowance, the Examiner is respectfully requested to contact the undersigned at 215-568-6400.

Respectfully submitted,

Selvaggi et al.

By 
Steven J. Gelman
Registration No. 41,034
(215) 568-6400

Volpe and Koenig, P.C.
United Plaza, Suite 1600
30 South 17th Street
Philadelphia, PA 19103

SJG/kag